STATE OF ILLINOIS
HENRY HORNER, *Governor*
DEPARTMENT OF REGISTRATION AND EDUCATION

DIVISION OF THE
NATURAL HISTORY SURVEY
THEODORE H. FRISON, *Chief*

Vol. XX BULLETIN Article V

Annotated List of the Fishes of Illinois

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PRINTED BY AUTHORITY OF THE STATE OF ILLINOIS

URBANA, ILLINOIS
AUGUST 1935

This paper is a contribution from the *Section of Aquatic Biology*

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ILLINOIS NATURAL HISTORY SURVEY BULLETIN
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Annotated List of the Fishes of Illinois

D. JOHN O'DONNELL

SINCE 1876, specimens and data regarding the appearance and distribution of fishes in this state have been collected by zoologists of the ILLINOIS STATE NATURAL HISTORY SURVEY and the organizations which were its predecessors. In 1909 Stephen Alfred Forbes and Robert Earl Richardson published a report entitled "The Fishes of Illinois," which was partly revised for a second edition printed in 1920[1]. Many scientific names of Illinois fishes have been changed in the twenty-six years that have passed since the original report was issued, so that today there is need for a list which will place the state fauna in accord with present general classifications.

Present Fauna

In recording the many changes that have been made by taxonomists, this list presents 172 species names, distributed among 31 families and 117 genera. In addition there are several dozen hybrid forms in the fish fauna of Illinois.

Ten species have been added to the forms known to Forbes and Richardson in 1909, some of which are names of American and foreign species that have become established in Illinois, and some native species previously undiscovered.

[1]See bibliography, p. 491.

Jordan Nomenclature

Because of its general usage, the manual of Jordan (1929), which changed the generic names associated with 70 species and the specific names of 31 species of fishes given in Forbes & Richardson, has furnished the nomenclature for this list. Names in the list by Jordan, Evermann and Clark (1930), as well as the old names of Forbes & Richardson (1920), are used in synonymy.

Names of Hybrids

There are a few exceptions to this rule. One, of course, is the case of certain hybrids, which Jordan did not recognize but which have nevertheless been classified and used separately, either by Forbes and Richardson in 1909 or subsequently in Jordan, Evermann & Clark (1930). *Apomotis (Lepomis) ischyrus, A. (Lepomis) euryorus* and *Notropis pilsbryi* are in this group. Likewise *Carpiodes thompsoni,* not recognized by Jordan and now probably best treated as a variety of *C. cyprinus,* is included in this list because it has been established in the literature of the Illinois fauna (Forbes & Richardson 1920), in addition to its placement as a distinct species in Jordan, Evermann & Clark (1930). *Alvordius (Hadropterus) evermanni* was included in Forbes & Richardson on the basis of a single

Fig. 1.—Interior of SURVEY laboratory boat Anax, looking forward.

specimen taken in the Illinois. Possibly a suspicion of its hybrid nature, as stated by Hubbs (1926), accounts for its omission from Jordan (1929). It recurs as valid, however, in Jordan, Evermann & Clark, on the strength of specimens from Indiana. The last exception is in the case of the red horses, whose names of Forbes & Richardson are retained. The descriptions of red horses given in Jordan (1929) and in Jordan, Evermann & Clark (1930), do not approximate our Illinois red horses closely enough to make their identity probable.

Forbes & Richardson Accurate

It has never been adequately emphasized that changes in the nomenclature of Illinois fishes have resulted entirely from the formalities of fish taxonomy and not from correction of any mistakes in segregation or identifications as used in 1903-06 by Forbes and Richardson. Neither have they resulted from any evolution of our species, nor from any refinement in the method of describing them. The descriptions which were written for "The Fishes of Illinois" were, in almost every case, based on the detailed examination and measurement of large numbers of Illinois specimens.

Common Names in Illinois

Lack of agreement among ichthyologists in regard to common names of fishes has forced the adoption in this list of those

common names which are now in most general use in Illinois. These common names and the recorded distributions have been included as far as known; it is hoped that this effort will stimulate others interested in the fish life of the state to fill the obvious gaps in many of the records.

Acknowledgments

This report is based upon field records kept by SURVEY zoologists and their forerunners, since 1876. A great deal of information and assistance have been contributed by present staff members, among them Dr. T. H. Frison, chief; Dr. David H. Thompson, zoologist; and Mr. F. D. Hunt, field naturalist, to all of whom the writer tenders thanks. An indebtedness is also acknowledged to Dr. Harley Jones Van Cleave, professor of zoology in the University of Illinois, for his suggestion of the problem while expressing a need among ichthyologists and less technical students for such a list.

CLASSIFIED LIST OF ILLINOIS FISHES

PETROMYZONIDAE

Ichthyomyzon Girard

I. concolor (Kirtland) *J JEC FR 9*[2]

LAMPER, LAMPER EEL, LAMPREY.—All Illinois streams with a drainage area exceeding 1000 square miles. Parasitic in winter on larger fishes such as carp, buffalo, catfishes and spoonbill. Three or more lampers may occasionally be found on one host fish.

Lethenteron Creaser & Hubbs

L. appendix (De Kay) *J JEC*
Lampetra wilderi Gage *FR 11*

BROOK LAMPREY, SMALL BLACK LAMPREY.—Very rare; Lake Michigan 1903, small creek near Danville winter of 1931. Numbers observed spawning on rocky riffles of Wild Cat creek near Dayton (Tippecanoe county), Ind., in early spring of 1910, 1916.

POLYODONTIDAE

Polyodon Lacépède

P. spathula (Walbaum) *J JEC FR 16*

SPOONBILL CAT, PADDLEFISH, BONELESS CAT.—Large rivers; recently found in the Mississippi, Ohio, Wabash, Illinois river to Henry, Rock river to Sterling, Kaskaskia river to Evansville. Everywhere less abundant than formerly. Almost absent from the upper Mississippi following construction of Keokuk dam.

ACIPENSERIDAE

Acipenser Linnaeus

A. fulvescens Rafinesque *J JEC*
Acipenser rubicundus Le Sueur *FR 24*

ROCK STURGEON, LAKE STURGEON.—Taken occasionally in the Mississippi, Ohio, Wabash and Rock rivers. Common in the Illinois river before 1900; now rare.

Scaphirhynchus Heckel

S. platorhynchus (Rafinesque) *J JEC FR 27*

SHOVEL-NOSED STURGEON, HACKLEBACK.—Common in the Mississippi and Ohio rivers. Occasionally taken in the lower Illinois.

Parascaphirhynchus Forbes & Richardson

P. albus Forbes & Richardson *J JEC FR 28*

WHITE STURGEON, LONG-NOSED STURGEON.—Rare; known only from the Mississippi river at Grafton and Alton.

[2] *J* indicates the present accepted name as given by Jordan (1929); *JEC* indicates the name given by Jordan, Evermann & Clark (1930); and *FR*, with a number, indicates the page on which the species is given in Forbes & Richardson (1920).

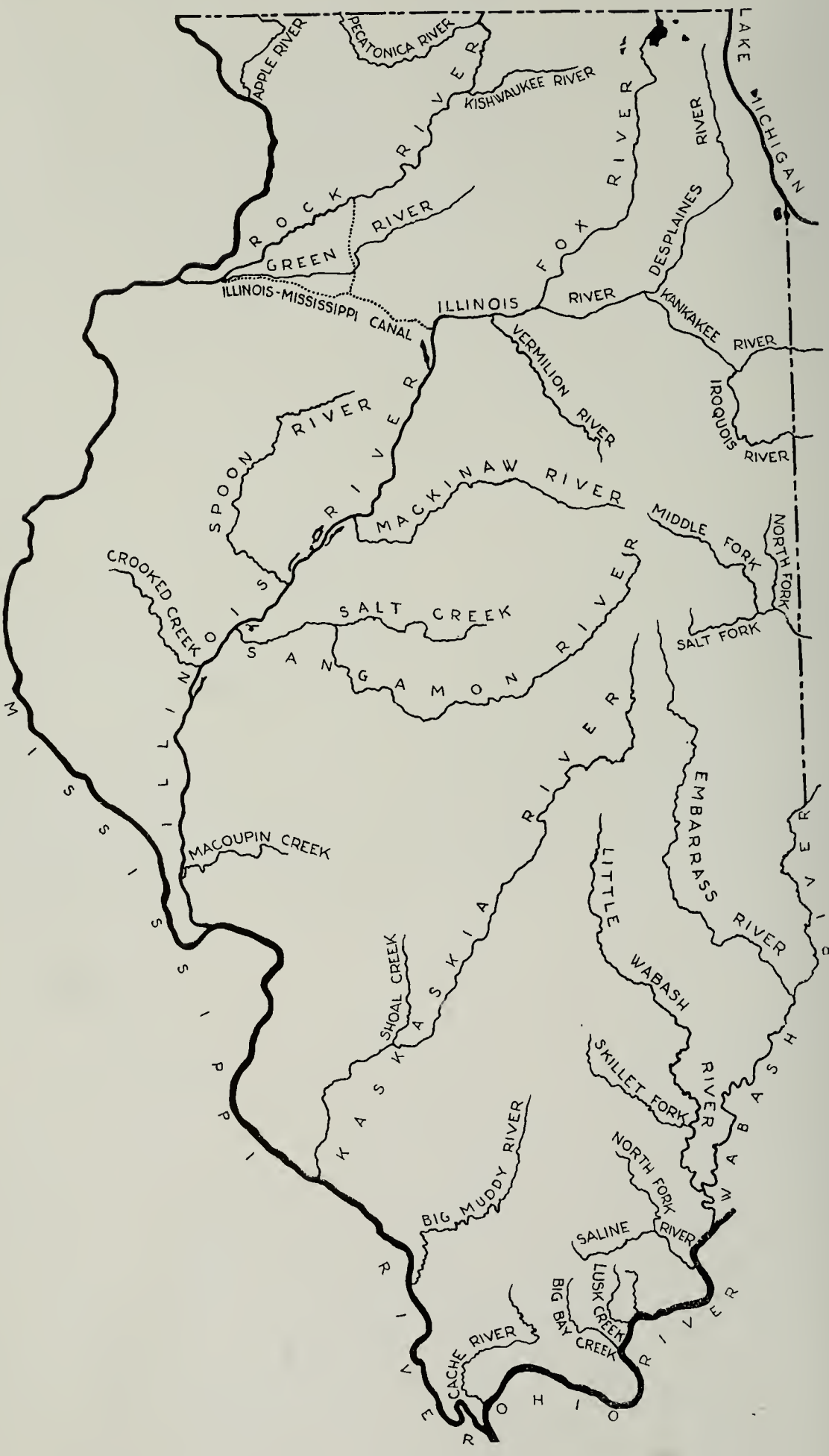

Fig. 2.—Principal streams of Illinois.

LEPISOSTEIDAE

Lepisosteus Lacépède

L. osseus (Linnaeus) *J JEC FR 31*

LONG-NOSED GAR, BILLY GAR.—Lakes. Found in all streams with drainage area exceeding 500 square miles.

Cylindrosteus Rafinesque

C. platostomus (Rafinesque) *J JEC*
Lepisosteus platostomus Rafinesque *FR 34*

SHORT-NOSED GAR.—Most abundant gar in rivers with drainage area of more than 5000 square miles.

Atractosteus Rafinesque

A. tristoechus (Schneider) *J*
Atractosteus spatula (Lacépède) *JEC. Lepisosteus tristoechus* (Bloch & Schneider) *FR 35*

ALLIGATOR GAR.—Mississippi river to Quincy. Occasionally in the Illinois to Henry, the Ohio, lower Wabash and lower Kaskaskia.

AMIIDAE

Amia Linnaeus

A. calva Linnaeus *J JEC FR 38*

DOGFISH, GRINDLE, BOWFIN.—Sloughs and lakes adjoining the Mississippi, Illinois and Ohio rivers. Not so abundant northward. Fox, Rock and Kankakee rivers. Occurs in the larger and more sluggish streams of southern Illinois.

HIODONTIDAE

Amphiodon Rafinesque

A. alosoides (Rafinesque) *J JEC*
Hiodon alosoides (Rafinesque) *FR 43*

NORTHERN MOONEYE, GOLDEYE.—Very rare; found only in the largest streams, and prefers swift open water. At one time abundant in the Mississippi and Ohio rivers, and the Illinois to Havana.

Hiodon Le Sueur

H. tergisus Le Sueur *J JEC FR 44*

TOOTHED HERRING, MOONEYE. — Occurs in small numbers in the Rock river to Beloit, Illinois river to Henry, Kaskaskia and Wabash rivers. Very abundant in the Mississippi and Ohio.

CLUPEIDAE

Pomolobus Rafinesque

P. chrysochlorus Rafinesque *J JEC FR 48*

SKIPJACK, GOLDEN SHAD, BLUE HERRING.—Not common in Illinois, a few having been taken from the lower Rock and lower Illinois rivers. Present in small numbers in the Mississippi and Ohio.

Alosa Linck

A. ohiensis Evermann *J JEC FR 49*

OHIO SHAD.—Rare; present in small numbers in the Mississippi and the Ohio to Pittsburgh. May occur in the Illinois up to Meredosia.

DOROSOMIDAE

Dorosoma Rafinesque

D. cepedianum (Le Sueur) *J JEC FR 45*

GIZZARD SHAD, HICKORY SHAD. — Abundant; generally distributed in all larger rivers, connecting lakes and occasionally smaller streams. Abundant in lakes having mud bottom.

COREGONIDAE

Prosopium Milner

P. quadrilaterale (Richardson) *J JEC*
Coregonus quadrilateralis Richardson *FR 53*

MENOMINEE WHITEFISH, ROUND WHITEFISH.—Lake Michigan. Much more rarely taken than the common whitefish.

Coregonus Linnaeus

C. clupeaformis (Mitchill) *J JEC FR 51*

COMMON WHITEFISH, SUPERIOR WHITEFISH.—Fairly abundant in southwestern Lake Michigan. Largest and most widely known of our species of whitefish.

Leucichthys Dybowski

L. artedi (Le Sueur) *J JEC*
Argyrosomus artedi (Le Sueur) *FR 54*

CISCO, LAKE HERRING, COMMON LAKE HERRING.—Lake Michigan. The most abundant food fish in the Great Lakes. In addition to the cisco, the following are more or less commonly taken in Lake Michigan: *L. reighardi* Koelz, the chub *L. zenithicus* (Jordan & Evermann), the longjaw *L. alpenae* Koelz, the mooneye cisco *L. hoyi* (Gill), *L. johannae* (Wagner), the mooneye *L. kiyi* Koelz, and the blackfin *L. nigripinnis* (Gill).

SALMONIDAE

Salmo Linnaeus

S. salar sebago Girard *J JEC*

LANDLOCKED SALMON, SEBAGO SALMON.—Lake Michigan: found in small numbers at the northern end; may also occur off Chicago.

Trutta Linnaeus

T. trutta (Linnaeus) *J JEC*

GERMAN BROWN TROUT.—A few have been reported by anglers from the tributaries of the Kishwaukee and Pecatonica rivers. It is uncertain whether this trout is able to propagate itself in natural waters of Illinois.

T. iridea (Gibbons) *J*
Salmo irideus Gibbons *JEC*

RAINBOW TROUT.—Common off Indiana and Michigan shores of Lake Michigan. To be expected off the Illinois shore. Probably not separable from *Salmo gairdnerii* Richardson.

Cristivomer Gill & Jordan

C. namaycush (Walbaum) *J JEC FR 56*

LAKE TROUT.—Fairly abundant in Lake Michigan off the Illinois shore.

Salvelinus Richardson

S. fontinalis (Mitchill) *J JEC*

EASTERN BROOK TROUT, SPECKLED TROUT.—In Franklin spring seven miles northwest of Rockford, and in spring-fed tributaries of the Kishwaukee, Pecatonica and Apple rivers. Is able to propagate itself in these localities. Also found in Blackberry creek near Yorkville but not propagating.

ANGUILLIDAE

Anguilla Thunberg

A. bostoniensis Le Sueur *J*
Anguilla rostrata (Le Sueur) *JEC. Anguilla chrysypa* Rafinesque *FR 59*

AMERICAN EEL, FRESH-WATER EEL.—Found in all streams having a drainage basin exceeding 500 square miles. Up to several hundred pounds taken per day by commercial fishermen at Browning on the Illinois.

CATOSTOMIDAE

Cycleptus Rafinesque

C. elongatus (Le Sueur) *J JEC FR 65*

MISSOURI SUCKER, BLACK HORSE, BLUEFISH.—Mississippi, Ohio and lower Illinois rivers. Formerly common in the lower Rock.

Megastomatobus Fowler

M. cyprinella (Cuvier & Valenciennes) *J JEC*
Ictiobus cyprinella (Cuvier & Valenciennes) *FR 68*

RED-MOUTH BUFFALO, BIG-MOUTH BUFFALO.—Very abundant in all larger streams and floodplain lakes. Found in the smaller, more sluggish streams with drainage areas exceeding 300 square miles. Second among Illinois commercial fishes.

Ictiobus Rafinesque

I. urus (Agassiz) *J JEC FR 70*

MONGREL BUFFALO, ROUND BUFFALO.—Distribution same as big-mouth buffalo but it is less abundant. Present known facts concerning the life history of this fish permit the interpretation that it is a natural hybrid between *Megastomatobus cyprinella* and *I. bubalus*.

I. bubalus (Rafinesque) *J JEC FR 72*

SMALL-MOUTH BUFFALO, QUILLBACK

BUFFALO, HIGHBACK BUFFALO, RAZORBACK BUFFALO.—Common in the Mississippi, Ohio, Illinois and Rock, and in the principal streams of the state generally. Prefers deep water. Characteristically a channel fish although common in some bottomland lakes and sloughs. Commercially important.

Carpiodes Rafinesque

C. carpio (Rafinesque) *J JEC FR 76*

COMMON RIVER CARP, SHAD, SILVEREEN.—Common in the Illinois, Rock and Mississippi. Seldom ascends smaller streams.

C. difformis Cope *J JEC FR 77*

BLUNT-NOSED RIVER CARP.—Common in some smaller streams of central Illinois. Taken sparingly in the Rock and Illinois rivers.

C. cyprinus (Le Sueur) *J JEC*
Carpiodes velifer (Rafinesque) *FR 78*

QUILLBACK, SILVER CARP.—Common in medium-sized rivers and larger creeks. Most abundant in northern Illinois. Avoids area of the lower Illinoisan glaciation.

C. thompsoni Agassiz *JEC FR 79*

LAKE CARP.—Found in the Great Lakes. Its recognition by Forbes and Richardson from the Illinois river is questioned. A recent examination of this genus by the late Mr. R. E. Richardson and Dr. David H. Thompson, using a large amount of fresh material including specimens from several points on the Great Lakes and other parts of the United States, indicates that *C. thompsoni* should be regarded as a variety of *C. cyprinus*.

Catostomus Le Sueur

C. catostomus (Forster) *J JEC FR 84*

LONG-NOSED SUCKER, NORTHERN SUCKER, RED SUCKER.—Lower Lake Michigan.

C. commersonii (Lacépède) *J JEC FR 85*

BLACK SUCKER, FINE-SCALED SUCKER, COMMON SUCKER.—Generally distributed throughout Illinois. Most abundant in the northern third of the state, especially in the smaller rivers and larger creeks. Common in Lake Michigan.

Hypentelium Rafinesque

H. nigricans (Le Sueur) *J JEC*
Catostomus nigricans Le Sueur *FR 86*

HOG SUCKER, HAMMERHEAD, STONEROLLER.—Common throughout northern and eastern parts of the state in headwaters of the smaller tributaries of the Illinois, Kaskaskia, Embarrass and Big Vermilion rivers. Prefers swifter streams with gravel bottom.

Erimyzon Jordan

E. sucetta oblongus (Mitchill) *J FR 81*
Erimyzon sucetta (Lacépède) *JEC. Erimyzon oblongus* (Mitchill) *JEC*

CHUB SUCKER, SWEET SUCKER.—Widely distributed in large and small streams. Essentially a creek species. Most abundant in eastern part of the state in the drainage of the Wabash and Ohio, and in the headwaters of the Sangamon and Kaskaskia. Common in the Fox lakes.

Minytrema Jordan

M. melanops (Rafinesque) *J JEC FR 83*

SPOTTED SUCKER, STRIPED SUCKER.—Taken in all stream systems, but most commonly in the Wabash and the Kaskaskia basins. Mainly a species of creeks and smaller rivers. Most abundant in certain lakes and ponds.

Moxostoma Rafinesque

M. anisurum (Rafinesque) *J JEC FR 89*

WHITE-NOSED SUCKER.—Lake Michigan and the Illinois, Sangamon, Rock, Mississippi, Ohio and Wabash. Distributed throughout the state in moderate numbers.

M. aureolum (Le Sueur) *J JEC FR 90*

COMMON RED HORSE.—Taken in all streams except the Big Muddy. Commonest in the northern and eastern two thirds of the state. Abundant in the Rock river basin and in the Kaskaskia, Wabash and Sangamon systems.

M. lesueurii (Richardson) *J JEC*
Moxostoma breviceps (Cope) *FR 91*

SHORT-HEADED RED HORSE.—All rivers, lakes and streams of the central and northern part. More abundant in the smaller rivers than in large rivers, creeks and lakes.

Placopharynx Cope

P. carinatus Cope *J JEC*
Placopharynx duquesnei (Le Sueur) *FR 93*

BIG-TOOTHED RED HORSE. — Rare in Illinois. One specimen from the Wabash, several from the Illinois. Not recognized with certainty in recent years.

Hagochila Jordan & Brayton

H. lacera Jordan & Brayton *FR 94*

RABBIT-MOUTH SUCKER.—Up to the present not found in Illinois. Probably inhabits the Wabash basin.

CYPRINIDAE

Cyprinus (Artedi) Linnaeus

C. carpio Linnaeus *J*[3] *FR 104*

EUROPEAN CARP.—Common or abundant in all streams draining more than 200 square miles. It is very abundant in the Illinois river and its connecting bottomland lakes. The carp is the most important commercial fish of the Illinois, the annual catch being 6 to 10 million pounds.

Carassius Nilsson

C. auratus (Linnaeus) *J*

GOLDFISH.—Rarely taken from the Illinois river and Lake Michigan. Common in Wolf lake near Chicago. Three specimens of a hybrid *Carassius auratus* × *Cyprinus carpio* have been taken, two from the Illinois at Peoria in 1932 and one from the Rock at Rockford, Feb. 1, 1933.

Chrosomus Rafinesque

C. erythrogaster Rafinesque *J JEC FR 112*

RED-BELLIED DACE.—Locally abundant. Occurs in small, clear, spring-fed tributaries of the Rock and Fox rivers. Found occasionally in small spring-fed streams of southern Illinois. Does not occur within the lower Illinoisan glaciation.

Notemigonus Rafinesque

N. crysoleucas (Mitchill) *J JEC*
Abramis crysoleucas (Mitchill) *FR 126*

GOLDEN SHINER, BREAM, ROACH. — Found in all streams. In the southern and eastern parts of the state it prefers creeks. Elsewhere it has been taken in greatest numbers along the larger rivers.

Opsopoeodus Hay

O. emiliae Hay *J JEC FR 124*

Most abundant in southern Illinois, especially in the Saline river. Prefers creeks and ponds. Northward it has been taken almost wholly along the larger rivers — the Illinois, the Rock and Mississippi.

Semotilus Rafinesque

S. atromaculatus (Mitchill) *J JEC FR 121*

HORNED DACE, CREEK CHUB.—Equally abundant in all the stream systems of Illinois. Prefers creeks and the smaller rivers.

Rhinichthys Agassiz

R. cataractae (Cuvier & Valenciennes) *J JEC FR 160*

LONG-NOSED DACE.—Rare; found only in Big creek near Anna, and near Waukegan. Prefers clear cold streams.

R. atronasus (Mitchill) *J JEC FR 162*

BLACK-NOSED DACE.—Rare; has been taken only in creeks of the northern part of the state, the Fox river, and from Big creek (two specimens) near Anna.

Extrarius Jordan

E. hyostomus (Gilbert) *J*
Macrhybopsis hyostoma (Gilbert) *JEC.*
Hybopsis hyostomus (Gilbert) *FR 163*

Taken in moderate numbers from the Rock, Green, Illinois and Mississippi.

Macrhybopsis Cockerell & Alliston

M. gelidus (Girard) *J*
Macrhybopsis gelida (Girard) *JEC*

[3]See Jordan (1929), p. 67, footnote.

Newly discovered in Illinois. Several specimens were taken in February 1930 from the Mississippi river at Chester.

Erimystax Jordan

E. dissimilis (Kirtland) *J JEC*
Hybopsis dissimilis (Kirtland) *FR 164*
SPOTTED SHINER.—Rare; found in the lower Kaskaskia, upper Embarrass, the Sangamon, Kickapoo, Spoon and Rock.

Erinemus Jordan

E. hyalinus (Cope) *J JEC*
Hybopsis amblops (Rafinesque) *FR 165*
SILVER CHUB, BIG-EYED CHUB.—Abundant in the southeastern part, also in the Mackinaw and upper Kankakee rivers. Prefers creeks. Restricted in central Illinois to the Middle Fork, Salt Fork and Embarrass river basins.

E. storerianus (Kirtland) *J JEC*
Hybopsis storerianus (Kirtland) *FR 166*
STORER'S CHUB.—Scarce. Widely distributed in the larger streams and lowland lakes. Not present in streams of the lower Illinoisan glaciation.

Nocomis Girard

N. biguttatus (Kirtland) *J*
Nocomis kentuckiensis (Rafinesque) *JEC.*
Hybopsis kentuckiensis (Rafinesque) *FR 167*
RIVER CHUB, HORNYHEAD. — Found only in the recently glaciated areas. Very abundant in streams and lakes of the northeastern section. Hybridizes with *Luxilus cornutus.*

N. micropogon (Cope) *J JEC*
Has been taken only from streams of the Wabash drainage. This species may have been included with *N. biguttatus* by Forbes & Richardson under *Hybopsis kentuckiensis.*

Platygobio Gill

P. gracilis (Richardson) *J JEC FR 170*
FLATHEAD CHUB.—Has been taken only from the Ohio at Cairo and the Mississippi at Chester.

Hybopsis Agassiz

H. deliciosus (Girard) *J*
Hybopsis phenacobius Forbes *JEC. Notropis phenacobius* Forbes *FR 138*
Rare; streams of central Illinois.

H. volucellus (Cope) *J JEC*
Notropis blennius (Girard) *FR 137*
STRAW-COLORED MINNOW. — Distributed throughout in clear streams and creeks. Most abundant in the extreme northern part. Avoids the southern Illinoisan glaciation.

H. dorsalis (Agassiz) *J*
Hybopsis gilberti (Jordan & Meek) *JEC. Notropis gilberti* Jordan & Meek *FR 139*
Prefers small rivers and creeks. Found in the Mississippi drainage.

H. boops Gilbert *J*
Hybopsis shumardi (Girard) *JEC. Notropis illecebrosus* (Girard) *FR 140*
BIG-EYED MINNOW.—Rare; closely limited to the tributaries of the Wabash in the eastern part.

H. anogenus (Forbes) *J JEC*
Notropis anogenus Forbes *FR 132*
PUGNOSE SHINER.—Rare in Illinois. Twenty-four specimens were collected in the upper Fox river at McHenry, Ill., in 1885, one individual from Fourth lake in 1892, three individuals from Pistakee lake in 1925 and 15 in 1930 from the same water.

H. heterolepis Eigenmann & Eigenmann *J*
Hybopsis cayuga (Meek) *JEC. Notropis cayuga* Meek *FR 133*
CAYUGA SHINER, BLACK-NOSED SHINER.—Not abundant in Illinois. Most common in creeks in the northern half of the state, although found in the northeastern glacial lakes.

H. heterodon (Cope) *J JEC*
Notropis heterodon (Cope) *FR 134*
BLACK-NOSED SHINER. — Distributed sparingly throughout, mainly in the lowland and glacial lakes in a way to indicate an avoidance of the lower Illinoisan glaciation. There is some evidence that one or two varieties of this species occur in Illinois but at the present time we are not able to separate them geographically or taxonomically.

H. nux richardsoni Hubbs & Greene *J JEC*

This form was found by Forbes and Richardson but the species had not been named at the time of their final report. It is closely related to *H. heterodon*. Taken in the lowland streams of the Wabash, Ohio and Big Muddy valleys.

H. atrocaudalis (Evermann) *J JEC*
Notropis cayuga atrocaudalis Evermann *FR 134*

Ten collections from the Illinois and adjacent waters near Meredosia, and one from the main river at Havana. Found in small numbers in the Kaskaskia and the streams of Champaign county.

H. hudsonius (DeWitt Clinton) *J*
Hudsonius hudsonius (DeWitt Clinton) *JEC. Notropis hudsonius* (DeWitt Clinton) *FR 141*

SPOT-TAILED MINNOW.—Very abundant though limited to the Mississippi and Lake Michigan drainage, and occurring but twice south of the central part of the state. Most abundant in the larger rivers and in lakes.

H. blennius (Girard) *J*
Paranotropis jejunus (Forbes) *JEC. Notropis jejunus* (Forbes) *FR 150*

Distributed sparingly along the larger streams. Scarce in creeks and only moderately abundant in lowland lakes. Avoids the lower Illinoisan glaciation.

Cyprinella Girard

C. lutrensis (Baird & Girard) *J*
Moniana lutrensis (Baird & Girard) *JEC. Notropis lutrensis* (Baird & Girard) *FR 143*

REDFIN.—Essentially a western species, occurring only in streams of the Mississippi drainage. Prefers streams of all sizes to lakes. Forbes & Richardson (1920) states, "It is very nearly allied to the next species, *N. whipplii,* compared with which it seems to be merely a more specialized form, the two sometimes intergrading in an obscure and very puzzling way."

C. whipplii (Girard) *J*
Erogala whipplii (Girard) *JEC. Notropis whipplii* (Girard) *FR 145*

STEEL-COLORED MINNOW. — Extremely abundant, especially in the smaller streams of the central part. Occurs in small numbers in all other parts. Scarce in lakes and large rivers. Prefers swift water.

Luxilus Rafinesque

L. cornutus (Mitchell) *J JEC*
Notropis cornutus (Mitchill) *FR 147*

COMMON SHINER.—Very abundant. Prefers creeks and the smaller rivers. Scarce in the southern third of the state, abundant in the rest. Hybridizes with *Nocomis biguttatus, Hybognathus nuchalis* and *Notropis rubrifrons.*

Notropis Rafinesque

N. photogenis (Cope) *J JEC*

SILVER SHINER.—Recently found in bottomland lakes of the Ohio near Brookport.

N. rubrifrons (Cope) *J JEC FR 153*

ROSY-FACED SHINER.—Occurs only in the Mississippi drainage of the northern third of the state. Taken in the tributaries of the Illinois, the Rock, the Fox and the Mississippi. Prefers clear rapid water. Hybridizes with *Luxilus cornutus.*

N. atherinoides Rafinesque *J JEC FR 151*

LAKE SHINER.—Distributed throughout. Less abundant in the Illinois, the Kaskaskia and the Big Muddy than in the other stream systems. Not present in the glacial lakes of northeastern Illinois.

N. pilsbryi Fowler *JEC FR 149*

This species is a hybrid between *Luxilus cornutus* and *Notropis rubrifrons.* Taken only in the east fork of the Mazon river near Gardner, and from the Sangamon in Champaign county.

Lythrurus Jordan

L. umbratilis cyanocephalus (Copeland) *J*
Lythrurus umbratilis (Girard) *JEC. Lythrurus atripes Jordan JEC. Notropis umbratilis atripes* (Jordan) *FR 154*

BLACKFIN. — Distributed throughout, being several times more numerous in the eastern half than in the western. Most

abundant in the Big Muddy, the tributaries of the Wabash and the small rivers and creeks of extreme southern Illinois. Jordan (1929) described this species as *Lythrurus atripes* from collections taken in streams of Union and Johnson counties.

Ericymba Cope

E. buccata Cope *J JEC FR 156*

SILVER-MOUTH MINNOW.—Headwaters of the minor tributaries of the Wabash and upper course of the Kaskaskia. Also in the tributaries of the Iroquois and the upper Sangamon.

Phenacobius Cope

P. mirabilis (Girard) *J JEC FR 158*

SUCKER-MOUTH MINNOW. — Most abundant in creeks. Occurs in all of our river basins but is not present in the upland glacial lakes. Prefers swift water and sandy bottom.

Ceratichthys Baird & Girard

C. vigilax Baird & Girard *J JEC*
Cliola vigilax (Baird & Girard) *FR 128*

BULLHEAD MINNOW. — Common throughout. Most abundant in the Kaskaskia and Wabash basins. Prefers swifter streams with clean bottom.

Hyborhynchus (Agassiz)

H. notatus (Rafinesque) *J JEC*
Pimephales notatus (Rafinesque) *FR 119*

BLUNT-NOSED MINNOW.—The most abundant and widely distributed minnow in Illinois. Very abundant in the lower Illinoisan glaciation, slightly less so in the waters of the northeastern part of the state.

Pimephales Rafinesque

P. promelas Rafinesque *J JEC FR 117*

BLACKHEAD MINNOW, FATHEAD. — Found in tributaries of all the stream systems in the northern and western three fourths of the state. Most abundant in creeks, the smaller rivers and ponds.

Hybognathus Agassiz

H. nuchalis Agassiz *J JEC FR 114*

SILVERY MINNOW.—Generally distributed throughout, occurring in many stream systems but most abundantly in southern Illinois. Hybridizes with *Luxilus cornutus.*

Dionda Girard

D. nubila (Forbes) *J JEC*
Hybognathus nubila (Forbes) *FR 116*

Rare; taken only in the northern part —Rock and Fox rivers.

Campostoma Agassiz

C. anomalum (Rafinesque) *J JEC FR 110*

DOUGHBELLY, GREASER CHUB, STONE-ROLLER.—Found in all creeks, where it is abundant, in the smaller rivers and occasionally in the larger rivers and lakes. Not found in streams of the lower Illinoisan glaciation.

AMEIURIDAE

Ictalurus Rafinesque

I. furcatus (Cuvier & Valenciennes) *J JEC FR 178*

BLUE CAT, FULTON CAT.—Common in the Mississippi and Ohio rivers and for a distance up their larger tributaries.

I. anguilla Evermann & Kendall *J JEC FR 179*

EEL CAT, WILLOW CAT.—Common. Found with *I. punctatus* and *Opladelus olivaris,* but in smaller numbers throughout the range.

I. punctatus (Rafinesque) *J JEC FR 180*

CHANNEL CAT, FIDDLER, SILVER CAT.—The most abundant of our true catfishes. It occurs in all river basins, sloughs and lakes. Four specimens taken in the Rock river at Rockford and Sterling in recent years seem to be hybrids between *Ictalurus punctatus* and *Opladelus olivaris.*

Villarius Rutter

V. lacustris (Walbaum) *J*
Haustor lacustris (Walbaum) *JEC. Ameiurus lacustris* (Walbaum) *FR 184*

CATFISH OF THE LAKES, NORTHERN CATFISH.—Reported as common in Lake Michigan.

Ameiurus Rafinesque

A. natalis (Le Sueur) *J JEC FR 187*

YELLOW BULLHEAD, YELLOW CAT. — Abundant throughout, except in the extreme northwestern part of the state. Most common in creeks and lowland lakes but found in all river basins, including the Michigan drainage area and the northeastern glacial lakes.

A. nebulosus (Le Sueur) *J JEC FR 187*

SPECKLED BULLHEAD, BROWN BULLHEAD.—Distributed throughout in lakes and large sluggish rivers, except in the extreme northwestern part of the state and within the lower Illinoisan glaciation. The least abundant of our bullheads.

A. melas (Rafinesque) *J JEC FR 190*

BLACK BULLHEAD. — Distributed throughout, very abundant in the smaller streams. Least abundant in the streams of the Lake Michigan drainage and most abundant in the creeks of the Mississippi bluffs and in the valleys of the Wabash and Kaskaskia rivers. The most abundant of our bullheads.

Opladelus Rafinesque

O. olivaris (Rafinesque) *J JEC*
Leptops olivaris (Rafinesque) *FR 193*

MUD CAT, FLATHEAD CAT, GOUJON, YELLOW CAT.—Common in the Illinois, Mississippi and Ohio, and also found in the Rock and Wabash rivers. Taken in smaller numbers from the Spoon, Green, Little Wabash, Sangamon and Kaskaskia rivers and from Crooked creek.

Noturus Rafinesque

N. flavus Rafinesque *J JEC FR 194*

STONECAT.—Common and widely distributed in the larger creeks and smaller rivers of the northern half of the state, but has never been taken south of Douglas county. Prefers swift current and a rock and gravel bottom.

Rabida Jordan

R. exilis (Nelson) *J JEC*
Schilbeodes exilis (Nelson) *FR 199*

SLENDER STONECAT.—Rare; found in the Illinois river, in the Pecatonica at Freeport, in the Du Page in Will county, in Honey creek in Henderson county, in the Sangamon in Champaign county, and in two creeks of Union county in extreme southern Illinois.

R. miurus (Jordan) *J JEC*
Schilbeodes miurus (Jordan) *FR 200*

BRINDLED STONECAT.—Confined principally to tributaries of the Wabash and Ohio. Although common, it has a spotty distribution in streams, preferring a gravel bottom and swift current. It is occasionally found in the extreme headwaters of the Kaskaskia.

Schilbeodes Bleeker

S. gyrinus (Mitchill) *J JEC FR 197*

TADPOLE CAT, MAD TOM.—Distributed throughout in larger rivers, creeks, upland and lowland lakes. Prefers still and muddy water. Enters the lower Illinoisan glaciation. This species is most abundant south and east in branches of the Kaskaskia and Wabash rivers.

S. nocturnus (Jordan & Gilbert) *J FR 198*
Rabida nocturna (Jordan & Gilbert) *JEC*

FRECKLED STONECAT.—Rare; found in creeks near Havana and Lincoln, in tributaries of the Kaskaskia in Clinton and Shelby counties, and in Camp creek in Henderson county.

UMBRIDAE

Umbra (Krämer) Müller

U. limi (Kirtland) *J JEC FR 203*

MUD MINNOW, MUDFISH.—Occurs almost entirely in ponds, lakes and ditches in the extreme northern and southern parts. Occasionally taken at Havana and Meredosia on the Illinois river.

ESOCIDAE

Esox (Artedi) Linnaeus

E. vermiculatus Le Sueur *J JEC FR 206*

GRASS PIKE, LITTLE PICKEREL.—Dis-

tributed throughout, most abundantly in the southern part. Most common in creeks, but also found in ponds and the smaller rivers. Prefers quiet and muddy waters.

E. lucius Linnaeus *J FR 207*

COMMON PIKE, PICKEREL, GREAT NORTHERN PIKE.—Abundant in the headwaters of the Kankakee and the glacial lakes of the northeastern part. Occasionally taken in the clearer sloughs and lakes of the Illinois, Rock and Green rivers. This may prove to be *Esox estor* Le Sueur, an American form as yet not clearly separated from *Esox lucius* Linnaeus of Europe, as is stated in Jordan, Evermann & Clark (1930).

E. masquinongy Mitchill *J JEC FR 209*

MUSKELLUNGE.—Reported in earlier years from lakes in the northeastern part. One was taken from Fox lake by a SURVEY field party in 1930.

CYPRINODONTIDAE

Fundulus Lacépède

F. diaphanus menona (Jordan & Copeland) *J FR 211*

Zygonectes diaphanus menona (Jordan & Copeland) *JEC*

MENONA TOP MINNOW, MENONA KILLIFISH.—A northern and middle western species in the United States. Has been taken here less than 50 times, all in the northern half of the state. Found in the headwaters of the Fox, Des Plaines and Rock rivers, in pools near Bloomington and in the Calumet ponds. Prefers clear water and sand bottom.

Zygonectes Agassiz

Z. dispar Agassiz *J JEC*

Fundulus dispar Agassiz *FR 212*

BLACKCHEEK TOP MINNOW.—Occurs throughout in bottomland lakes of the larger rivers and in creeks. Abundant in the upland lakes of northeastern Illinois. Most abundant in lakes and sloughs.

Z. notatus (Rafinesque) *J JEC*

Fundulus notatus (Rafinesque) *FR 213*

TOP MINNOW, TOPWATER.—Very abundant throughout in all types of waters. Most abundant in the smaller streams and headwaters of southern and eastern parts.

POECILIIDAE

Gambusia Poey

G. patruelis (Baird & Girard) *J JEC*

Gambusia affinis (Baird & Girard) *FR 215*

MOSQUITO FISH, VIVIPAROUS TOP MINNOW.—Fairly common in extreme southern Illinois. It has been taken also from Quincy, Meredosia, Pekin and in the Fox river basin. Several specimens taken from Horseshoe lake, July 5, 1933, contained embryos with prominent eye spots. Females collected August 15 contained young apparently ready for extrusion. Prefers ditches, marshes and lagoons.

AMBLYOPSIDAE

Forbesella Jordan & Evermann

"This genus contains transitional species connecting *Chologaster* with *Typhlichthys*," Jordan (1929).

F. papillifera (Forbes) *J JEC*

Chologaster papilliferus Forbes *FR 218*

SPRING CAVE FISH.—Cave springs, Union and Pope counties.

PERCOPSIDAE

Percopsis Agassiz

P. omiscomaycus (Walbaum) *J JEC*

Percopsis guttatus Agassiz *FR 225*

TROUT PERCH.—Abundant in bottomland lakes along the Illinois river from Meredosia to Hennepin. Also from a small stream near Lincoln, Logan county, and once from Lake Michigan off Chicago.

APHREDODERIDAE

Aphredoderus Le Sueur

A. sayanus (Gilliams) *J JEC FR 229*

PIRATE PERCH.—In muddy pools and streams throughout the state, most com-

mon southward. Prefers muddy bottom and little or no current.

GASTEROSTEIDAE

Pungitius Coste

P. pungitius (Linnaeus) *J JEC*
Pygosteus pungitius (Linnaeus) *FR 224*

NINE-SPINE STICKLEBACK.—Taken but once, from the lower Calumet river and from the adjacent part of Lake Michigan.

Eucalia Jordan

E. inconstans (Kirtland) *J JEC FR 222*

BROOK STICKLEBACK.—Confined to the lakes of northeastern Illinois, the Calumet river at South Chicago, tributaries of the Rock and Fox rivers, and creeks in La Salle county. Prefers clear cool brooks. Associated with water cress.

ATHERINIDAE

Labidesthes Cope

L. sicculus (Cope) *J JEC FR 227*

BROOK SILVERSIDE. — Distributed throughout the northern, central and eastern parts, but not taken from the Big Muddy, the Saline and other waters of extreme southern Illinois. Prefers clear streams and lakes.

CENTRARCHIDAE

Huro Cuvier

H. salmoides (Lacépède) *J*
Huro floridana (Le Sueur) *JEC. Micropterus salmoides* (Lacépède) *FR 267*

LARGE-MOUTH BLACK BASS.—Equally distributed throughout, passing freely into the lower Illinoisan glaciation. Most common in the larger and more sluggish rivers, upland and lowland lakes.

Micropterus Lacépède

M. dolomieu Lacépède *J JEC FR 263*

SMALL-MOUTH BLACK BASS.—A northern fish, avoiding the lower Illinoisan glaciation. Most abundant in the smaller rivers and about half as abundant in creeks. Prefers clear swift water.

M. pseudaplites Hubbs *J JEC*

KENTUCKY BASS, SOUTHERN SMALL-MOUTH BLACK BASS.—Two specimens taken April 16, 1935, from Grand Pierre creek near Rosiclaire and one from the Ohio river at Shawneetown. General distribution is southeastern United States from western West Virginia northward to southern Ohio, westward to Kansas and central Texas.

Apomotis Rafinesque

A. cyanellus ((Rafinesque) *J JEC*
Lepomis cyanellus Rafinesque *FR 248*

GREEN SUNFISH, BLUE-SPOTTED SUNFISH.—Common throughout. Most abundant in creeks, the smaller rivers and ponds. Hybridizes with *Eupomotis gibbosus, Allotis humilis, Helioperca incisor, Xenotis megalotis* and *Chaenobryttus gulosus.*

A. ischyrus (Jordan & Nelson) *JEC*
Lepomis ischyrus (Jordan & Nelson) *FR 250*

BIG-NOSED SUNFISH.—Rare; not known outside of Illinois. Several specimens have been taken from the Illinois river at Meredosia. Proved by Hubbs (1932) and recent SURVEY experiments to be a hybrid between *Apomotis cyanellus* and *Helioperca incisor.*

A. euryorus (McKay) *JEC*
Lepomis euryorus McKay *FR 252*

Very rare. Has been taken only from Crooked creek near La Harpe, in Hancock county. Hubbs (1932) has proved by experimental breeding that this form is the hybrid *Apomotis cyanellus* × *Eupomotis gibbosus.*

Lethogrammus Hubbs

L. symmetricus (Forbes) *J*
Apomotis symmetricus (Forbes) *JEC. Lepomis symmetricus* Forbes *FR 251*

Rare; found in lakes and streams of southern Illinois. Also taken twice from the Illinois river at Pekin.

Sclerotis Hubbs

S. miniatus (Jordan) *J JEC*

Lepomis miniatus Jordan *FR 253*

OLD-FASHIONED SUNFISH, RED PERCH. —Formerly common, now rare; taken occasionally from bottomland lakes and ponds of the Illinois river.

Allotis Hubbs

A. humilis (Girard) *J JEC*
Lepomis humilis (Girard) *FR 255*

ORANGE-SPOTTED SUNFISH.—Distributed throughout, most abundant in creeks and the smaller rivers. Rare or absent in extreme northern Illinois. Hybridizes with *Apomotis cyanellus, Helioperca incisor* and *Xenotis megalotis*. In Lake Senachwine and in Crystal lake in Urbana, it shows intergrades of many sorts with *Eupomotis gibbosus,* as if some hybrids between these species at these points had proved fertile and produced other segregates.

Xenotis Jordan

X. megalotis (Rafinesque) *J JEC*
Lepomis megalotis (Rafinesque) *FR 254*

LONG-EARED SUNFISH. — Extremely abundant in the smaller streams of the southern and eastern parts, comparatively scarce in the remainder of the state. Hybridizes with *Eupomotis gibbosus, Helioperca incisor, Apomotis cyanellus* and *Allotis humilis.*

X. megalotis peltastes (Cope) *J*
Lepomis megalotis peltastes Cope *FR 254*

DWARF LONG-EARED SUNFISH. — A dwarf race of northern Illinois. Has been taken only in the clear swift water of the Fox from Ottawa to the Fox lakes, in the Du Page at Naperville, in the Vermilion at Pontiac and Fairbury, in a small creek in Du Page county and in Indian creek, La Salle county.

Helioperca Jordan

H. incisor (Cuvier & Valenciennes) *J JEC*
Lepomis pallidus (Mitchill) *FR 257*

BLUEGILL, BLUE SUNFISH.—Principal sunfish of the state. Occurs throughout but most abundant in the larger streams and their principal tributaries. Also common in all lakes. Hybridizes with *Eupomotis gibbosus, Xenotis megalotis, Apomotis cyanellus, Chaenobryttus gulosus* and *Allotis humilis.*

Eupomotis Gill & Jordan

E. heros (Baird & Girard) *J JEC FR 259*

A southern species, rare in Illinois. Has been taken at a few points in the Wabash basin and in the Ohio at Brookport.

E. gibbosus (Linnaeus) *J JEC FR 260*

PUMKINSEED.—Very abundant in the upland lakes of Lake and McHenry counties and in lakes along the Illinois. Very scarce south of the center of the state. Essentially a pond species, and next most abundant in the smaller rivers. Produces sterile hybrids with *Helioperca incisor, Xenotis megalotis, Apomotis cyanellus* and *Chaenobryttus gulosus.* Shows fertile segregates with *Allotis humilis.*

Chaenobryttus Gill

C. gulosus (Cuvier & Valenciennes) *J JEC FR 245*

WARMOUTH BASS. — Distributed throughout in small numbers. Abundant in the glacial lakes of northeastern Illinois and also in the lower Illinoisan glaciation. Prefers muddy water. Hybridizes with *Eupomotis gibbosus, Helioperca incisor* and *Apomotis cyanellus.*

Ambloplites Rafinesque

A. rupestris (Rafinesque) *J JEC FR 243*

ROCK BASS, GOGGLE-EYE. — Mainly a northern species, having been taken from only five localities in southern Illinois, and not at all in the lower Illinoisan glaciation. Most abundant in rivers of medium size and in the glacial lakes.

Pomoxis Rafinesque

P. annularis Rafinesque *J JEC FR 238*

WHITE CRAPPIE.—Occurs in all parts, most abundantly in lakes, ponds and bayous but common also in the smaller rivers and in creeks.

P. sparoides (Lacépède) *J JEC FR 240*

BLACK CRAPPIE, CALICO BASS.—Found

throughout, usually with the white crappie. It is slightly less common than *P. annularis* in creeks, but more abundant in the northeastern glacial lakes and the bottomland lakes of the Illinois.

Centrarchus Cuvier & Valenciennes

C. macropterus (Lacépède) *J JEC FR 241*

ROUND SUNFISH, FLIER.—Found only in southern Illinois from Hamilton county southward; taken only from creeks and sloughs tributary to the Little Wabash, the Big Muddy, the Cache and a small creek near Brookport. Very abundant in Horseshoe lake.

ELASSOMIDAE

Elassoma Jordan

E. zonatum Jordan *J JEC FR 232*

PIGMY SUNFISH.—Has been taken only six times; from Little Fox river at Phillipstown, Wabash river at Wabash Station, Drew pond in White county, Swan pond near St. Francisville, Running lake, and from a bluff spring in Union county.

ETHEOSTOMIDAE

Vigil Jordan

V. pellucidus (Baird) *J JEC*
Ammocrypta pellucida (Baird) *FR 301*

SAND DARTER.—Has been taken only in the Middle Fork of the Vermilion in the Wabash basin, lower Kaskaskia, lower Illinois and in the Rock river.

Crystallaria Jordan & Gilbert

C. asprella (Jordan) *J JEC FR 300*

Rare; has been taken from the Rock river at Cleveland, Erie and Milan, from the Little Wabash at Effingham and the Mississippi at East Dubuque. First described from specimens taken in a rocky creek of the Mississippi bluffs in Hancock county.

Boleosoma De Kay

B. nigrum (Rafinesque) *J JEC FR 294*

JOHNNY DARTER.—Very abundant, distributed throughout. Most abundant in the small streams of the Kaskaskia and Wabash systems. Prefers creeks and small brooks.

Vaillantia Jordan

V. camura (Forbes) *J JEC*
Boleosoma camurum Forbes *FR 298*

SNUB-NOSED DARTER.—Very abundant in southern part. Most abundant in the Big Muddy and Saline basins. Prefers creeks and the smaller rivers.

Etheostoma Rafinesque

E. blennioides Rafinesque *J JEC*
Diplesion blennioides (Rafinesque) *FR 292*

GREEN-SIDED DARTER.—Has been taken only from the smaller streams of the Wabash system.

Imostoma Jordan

I. shumardi (Girard) *J JEC*
Cottogaster shumardi (Girard) *FR 290*

RIVER DARTER.—Not common. Occurs wholly along the courses of the larger streams, and has been taken from Lake Michigan at Chicago.

Percina Haldeman

P. caprodes (Rafinesque) *J JEC FR 282*

LOG PERCH.—Distributed throughout. Most common in lakes and medium-sized rivers. More abundant in the northern than in central and southern parts.

Alvordius Girard

A. evermanni (Moenkhaus) *JEC*
Hadropterus evermanni Moenkhaus *FR 284*

One specimen taken from the Illinois river at Havana. Hubbs (1926) regards this form as a hybrid of undetermined parentage.

A. phoxocephalus (Nelson) *J JEC*
Hadropterus phoxocephalus (Nelson) *FR 285*

SHARP-NOSED DARTER. — Occurs throughout except in the northern glacial lakes. Most abundant in the smaller streams.

A. maculatus Girard *J JEC*
Hadropterus aspro (Cope & Jordan) *FR 286*

BLACK-SIDED DARTER. — Occurs

throughout except in the northern glacial lakes. Common in the smaller rivers and creeks, rare in the larger rivers.

A. ouachitae (Jordan & Gilbert) *J JEC*
Hadropterus ouachitae (Jordan & Gilbert) *FR 288*

One specimen taken from the Wabash river at New Harmony, Indiana, in 1909.

Serraria Gilbert

S. sciera (Swain) *J JEC*
Hadropterus scierus Swain *FR 289*

Two specimens taken from the Embarrass river near Charleston.

Ericosma Jordan

E. evides (Jordan & Copeland) *J JEC*
Hadropterus evides (Jordan & Copeland) *FR 288*

BARRED DARTER.—One specimen taken from the Rock river in 1877. Several specimens taken from the same river at Rock Island in 1927 and at Sterling in 1932. One specimen taken from the Kaskaskia in 1930.

Nanostoma Putnam

N. zonale (Cope) *J JEC*
Etheostoma zonale (Cope) *FR 304*

BANDED DARTER. — Limited to the northern half of the state except for a single collection from the Wabash. Prefers the smaller rivers to creeks or large rivers.

Nothonotus Agassiz

N. camurus (Cope) *J JEC*
Etheostoma camurum (Cope) *FR 306*

BLUE-BREASTED DARTER.—Has been taken several times from the Salt Fork and Middle Fork of the Vermilion river. Reported from Peoria, from Union county and the Saline and lower Wabash basins.

Oligocephalus Girard

O. jessiae (Jordan & Brayton) *J JEC*
Etheostoma jessiae (Jordan & Brayton) *FR 307*

MUD DARTER.—Abundant. Prefers large streams and lowland lakes to small rivers and creeks. Not found in the upland glacial lakes. Three times as abundant in central and nearly twice as abundant in southern, as in northern Illinois.

O. coeruleus (Storer) *J JEC*
Etheostoma coeruleum Storer *FR 309*

RAINBOW DARTER.—Prefers creeks and smaller rivers having swift water and a clean bottom. More abundant in northern Illinois than is *O. jessiae*. Avoids the lower Illinoisan glaciation.

O. obeyensis (Kirsch) *J*
Nivicola obeyense (Kirsch) *JEC. Etheostoma obeyense* Kirsch *FR 311*

Rare; has been taken only in four collections, all from rocky and gravelly creeks in Pope and Hardin counties.

O. exilis (Girard) *J*
Oligocephalus iowae (Jordan & Meek) *JEC. Etheostoma iowae* Jordan & Meek *FR 306*

Abundant in northern Illinois in Pistakee lake, Wolf lake, Senachwine lake, Rock river, Green river, Pecunsagan creek, in the Illinois river at Ottawa and Dutchman's creek in Johnson county.

Claricola Jordan & Evermann

C. squamiceps (Jordan) *J JEC*
Etheostoma squamiceps Jordan *FR 312*

Has been taken only in southern Illinois south of the Saline river, except for one collection from Robinson creek, a branch of the Kaskaskia in Shelby county, and a collection from the Little Wabash river near Carmi in White county. Prefers swift water and gravel bottom.

Catonotus Agassiz

C. flabellaris (Rafinesque) *J JEC*
Etheostoma flabellare Rafinesque *FR 313*

FAN-TAILED DARTER. — Prefers the smaller streams. Has been taken only once within the lower Illinoisan glaciation. Most abundant in the northern third of the state, fairly abundant in the central third.

Hololepis Agassiz

H. fusiformis (Girard) *J*
Boleichthys fusiformis (Girard) *JEC FR 315*

FUSIFORM DARTER, BROWN-SIDED DART-

ER.—Most abundant in the creeks and smaller rivers. Found in the upland lakes of Lake and McHenry counties and abundant in the southeastern part of the state. Prefers sluggish water and mud bottom.

Microperca Putnam

M. punctulata Putnam *J JEC FR 317*

LEAST DARTER.—Not present in the central part but abundant in the upland lakes of northeastern Illinois. Has been taken from Skillet Fork in Wayne county and from Drury creek in Union county.

PERCIDAE

Perca (Artedi) Linnaeus

P. flavescens (Mitchill) *J JEC FR 276*

YELLOW PERCH, RINGED PERCH.—Common in the upland lakes of the northeastern part and in the Illinois and Mississippi rivers as far south as Meredosia. Has never been taken in the Wabash or Kaskaskia systems or from streams in southern Illinois.

Stizostedion Rafinesque

S. vitreum (Mitchill) *J JEC FR 272*

WALL-EYED PIKE, WALLEYE, JACK SALMON.—Abundant in the swifter waters of the Rock and Kankakee rivers. Smaller numbers in the Wabash, Mississippi, Fox and Illinois rivers.

Cynoperca Gill & Jordan

C. canadensis grisea (De Kay) *J*
Cynoperca grisea (De Kay) *JEC. Stizostedion canadense griseum* (De Kay) *FR 274*

GRAY PIKE, SAUGER, SAND PIKE.—Has been taken mainly from the Mississippi and Illinois and sparingly from the Rock, Wabash and Kaskaskia. Most common in the Ohio. In this state, *C. grisea* probably grades into *C. canadense.*

MORONIDAE

Lepibema Rafinesque

L. chrysops (Rafinesque) *J JEC*
Roccus chrysops (Rafinesque) *FR 319*

WHITE BASS.—Larger rivers and lakes. Most abundant in the Fox lakes and the Mississippi, Illinois and Ohio rivers.

Chrysoperca Fowler

C. interrupta (Gill) *J JEC*
Morone interrupta Gill *FR 321*

YELLOW BASS.—Prefers the large rivers and adjacent lakes. Most abundant in central Illinois.

SCIAENIDAE

Aplodinotus Rafinesque

A. grunniens (Rafinesque) *J JEC FR 323*

SHEEPSHEAD, FRESH-WATER DRUM, WHITE PERCH.—Abundant. Distributed throughout, commonest in central part.

COTTIDAE

Cottus (Artedi) Linnaeus

C. bairdii Girard *J*
Cottus ictalops (Rafinesque) *JEC FR 326*

MILLER'S THUMB, COMMON SCULPIN.—Has been taken only in northern and southern Illinois: in McHenry county, from tributaries of the Rock, from the Du Page river near Joliet, from rocky spring branches in Union county and from springs in Calhoun and Jersey counties.

C. ricei (Nelson) *J JEC FR 327*

One specimen taken at a depth of 600 feet from Lake Michigan, in Grand Traverse bay off Old Mission, Michigan.

C. cognatus Richardson *J*
Cottus franklini Agassiz *JEC. Uranidea kumleinii* Hoy *FR 328*

EASTERN MILLER'S THUMB.—Three specimens taken in deep water from Lake Michigan, in Grand Traverse bay off Old Mission, Michigan.

GADIDAE

Lota (Cuvier) Oken

L. maculosa Le Sueur *J JEC FR 331*

LAWYER, BURBOT, LING.—Lake Michigan. Has also been taken from the Illinois at Peoria, Havana, Meredosia and

Naples, from the Rock at Milan and from the Mississippi at Rock Island.

NOTE

Melanotaenia Gill

M. nigrans Richardson

AUSTRALIAN RAINBOW FISH.—Three specimens were collected in July 1930 by Mr. Fred G. Orsinger of the John G. Shedd Aquarium, Chicago, Dr. Wilbur Luce of the University of Illinois and Dr. Thompson of the ILLINOIS STATE NATURAL HISTORY SURVEY. They were taken in a minnow seine, near the edge of a sand bar in the Mississippi river, out from the Southern Illinois Penitentiary. They were taken alive to the Shedd Aquarium, where they were identified by Dr. Carl Hubbs of the University of Michigan. It is supposed that they may have escaped from some tropical fish establishment in St. Louis, some 40 miles upstream.

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APPENDIX

HYBRIDIZATION AND RACIAL DIFFERENTIATION AMONG ILLINOIS FISHES[4]

A list of the different kinds of Illinois fishes would be incomplete without mention of the hybrids which result from crosses between certain species.

Occurrence of Hybrids

Within certain groups of fishes and in certain localities, hybrids occur in frequencies as high as one in ten, or as low as one in several thousand. The greater number and variety of hybrids among these fishes, as compared with other groups of animals, may be a reflection of the breeding habit of these fishes, whereby the sperm of the male is set free in the water to be carried over wide areas while still alive and capable of fertilizing an egg. It seems somewhat more probable that in these fishes the devices for species recognition, or "consciousness of kind," are not so effective nor so rigidly fixed as among other animals. In this connection it may be mentioned that the groups of fishes which commonly produce natural hybrids are kinds (minnows, sunfishes and darters) which exhibit striking differences in the appearance of the two sexes. Those natural hybrids which have been studied in greatest detail are sterile, grow more rapidly than do the parent species, and show an excess of males. Two apparent exceptions to the rule of sterility will be mentioned later.

Experimental Confirmation

The bulk of our knowledge of natural hybrids among native fresh-water fishes has been contributed in recent years by Doctor Carl L. Hubbs. He has produced certain hybrid combinations of sunfishes in aquaria. Doctor Wilbur M. Luce during the last three seasons has developed a method for stripping and fertilizing eggs from sunfishes and has been able to rear the hybrid young in aquaria. Two of the sunfishes listed as ordinary species in Forbes & Richardson (1920) have now been produced experimentally by crossing other native sunfishes. At the present time almost all of the hybrid combinations of the following six species of Illinois sunfishes have been found in Illinois waters: *Apomotis cyanellus, Allotis humilis, Xenotis megalotis, Helioperca incisor, Eupomotis gibbosus* and *Chaenobryttus gulosus.*

The recognition of hybrids among these sunfishes is facilitated by the striking and distinctive color patterns of these species, certain characteristic features of both parents appearing in the hybrid as if the color patterns were superimposed. Hybrids between the pumpkinseed and the bluegill show two shapes of body as though they were reciprocal hybrids analogous to the mule and the hinny.

Other Common Hybrids

It is now reasonably certain that many minnows, previously regarded as anomalous and unclassifiable, are in reality species hybrids among various *Cyprinidae.* In Illinois, hybrids of the common shiner, *Luxilus cornutus,* with certain nest-building minnows (as pointed out by Doctor Hubbs), are especially common, presumably because of the fact that *Luxilus* habitually deposits its eggs in the nests of these other minnows. Hybrids within the group of darters are also believed to be rather common. A few readily recognized hybrids between goldfish and the European carp have been found in Illinois waters. Three or four catfishes have been taken in Rock river which appear to be hybrids between the channel cat, *Ictalurus punctatus,* and the flathead cat, *Opladelus olivaris,* both of which spawn in holes, hollow logs, etc. While it has not been proved that the so-called "mongrel" buffalo, *Ictiobus urus,* is really a hybrid

[4]By David H. Thompson.

Fig. 3.—Raising SURVEY hoop net along the east bank of the Illinois river below Havana.

between the other two native species, there is a considerable body of circumstantial evidence to indicate that such is the case. Some of the difficulties of identification in the genus *Carpiodes* and in the genus *Moxostoma* may be attributed to occasional hybridization within these genera.

Known Fertile Hybrids

In all of the above-named hybrids, whether proved or presumptive, the evidence indicates that they are in reality "mules" and incapable of propagation. In Illinois we have found two apparent exceptions to this rule. One of these has to do with the intergradation of *Cyprinella lutrensis* and *Cyprinella whipplii* in the region about the mouth of the Sangamon river near Chandlerville and Beardstown. At this point we not only find typical *lutrensis* and typical *whipplii* but also all possible combinations of the characteristics which are used to separate these two species.

Intergradations of this sort have also been found between the orange-spotted sunfish and the pumpkinseed sunfish in two localities — Senachwine lake near Henry and Crystal lake in Urbana. It seems certain that some hybrids between these two species have been fertile. Segregation and recombination of the characteristics of these two species have not been found in other waters of the state where they both occur. A rather detailed study of the segregates of this pair of species in Lake Senachwine suggests that the hybrids between these two species have not bred *inter se* but have back-crossed to the orange-spotted sunfish.

Difference and Distance

A few years ago while making a detailed study of the fishes of the small streams which drain Champaign county, it was found that the fan-tailed darters, *Catonotus flabellaris*, of the streams draining into the Wabash had a consistently lower average number of spines in the dorsal fin than did those from streams draining into the Mississippi. It was also noticed that the orange-spotted sunfish, *Allotis humilis*, of the Sangamon river, which drains to the west, had a consistently steeper profile than did the same species in the Salt Fork, which drains to the east.

A study of the average dorsal spine and ray numbers of the Johnny darter, *Boleosoma nigrum*, collected from the various streams of Champaign county showed that the difference between the mean spine or ray numbers of any two populations increased with the water distance separating

Fig. 4.—Opening the tail compartment of a SURVEY hoop net, showing a catch of black crappies, carp and other fishes from the Illinois river.

these populations. The Johnny darter is well suited for such a study, since it is abundant, cosmopolitan in its range and sedentary in habit. The sedentary habit is to be emphasized because it appears that measurable differences between the mean spine or ray numbers of populations from different stream systems occur only among the more sedentary kinds. When such differences were sought among actively migrating kinds such as the suckers, they were not found. In brief, we may conclude that some kinds of fishes move so slowly that a measurable degree of evolution takes place while they are traveling from one stream to another.

Fin Phylogeny

A later and still more detailed study of the Johnny darters from all parts of Illinois, and using counts of the spines and rays of all of the fins, has substantiated the conclusion that the difference between the mean spine or ray numbers of two populations increases with increasing water distance separating these populations. This evidence indicates that these observed differences in average spine or ray numbers result, for the most part, from hereditary differences, and not from differences in the environment in which the various populations developed. The difference between the mean spine or ray numbers of any two populations is nearly proportional to the logarithm of water distance separating them.

It should be understood that water distance, as used here, implies water distance between different parts of the Mississippi system where there have been no barriers to the free movement of fishes until recent years. When the spine and ray numbers of the Johnny darter are compared with the spine and ray numbers of other subspecies of the Johnny darter, such as *Boleosoma nigrum olmstedi,* (found in streams draining into the Atlantic from Quebec to Maryland) it is found that this difference is about twice as great as the average difference found between points within the Mississippi system separated by 3,000 miles of water.

Similarly, the amount of difference found between *Boleosoma nigrum* and another closely related Illinois species, *Vaillantia camura,* is about twice as great as the difference found between subspecies of the Johnny darter.

Other Taxonomic Differences

Not only are there consistent racial differences in the number of spines and rays of the Johnny darter and other sedentary fishes, but we also find consistent differences between different stream systems involving other taxonomic characteristics which are commonly used by ichthyologists to separate species, such as, for example, number of scales in the lateral line, number of scales bearing pores, number of rows of scales, color pattern, degree of scalation of body, cheek, nape and breast, the body contour and point of insertion of fins. Spine and ray numbers in the fins have been used in these studies merely because they seem to show nonadaptive variations, and because they may be easily and accurately treated in a quantitative manner. These considerations suggest that the degree of difference between any two fish populations forms a continuous series from the most insignificant racial differences up to the largest family differences.

Some of the evolutionary and genetic aspects of these racial differences in fishes as related to the nature of fish species have been discussed in two short papers published in the Transactions of the Illinois State Academy of Science (Thompson 1931, 1934).

INDEX TO FAMILIES, GENERA AND SPECIES

The index refers only to the mention or placement of names in the classified list, pp. 475-91. Synonymy is indicated by italic type. Family names are in capitals.

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INDEX

The reader is referred to preceding indexes of families, genera and species at pages 270-79 for Dermaptera and Orthoptera, 468-71 for Plecoptera, and 495-500 for the fishes of Illinois. Inasmuch as articles I and II were printed without indexes, items pertaining to them have been gathered below under the headings "elm disease" and "fishery of the Kaskaskia river," respectively.

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